

## CLAIMS

1. Acoustic apparatus for detecting, locating and identifying buried objects comprising:
  - an array of acoustic vector probes near the surface of the ground,
  - a source of intense sound pulses of short duration for penetrating the
  - 5 porous structure of the ground;
  - said probes in said array connected to a multi-channel data acquisition system for rapid conversion of analog signals to digital form and for temporary data storage;
  - said multi-channel system providing input to a digital signal processor
  - 10 programmed to compute the sound-intensity vector at each probe in said array;
  - said processor connected to a device for outputting the results of the computations;
  - said processor controlling both said source of pulsed sound and said multi-channel data acquisition system.
2. The invention as in claim 1 wherein each acoustic vector probe in said array is isolated to prevent vibrational interference from random disturbances and from said source of pulsed sound.
- 5 3. The invention as in claim 1 wherein said source of pulsed sound is a pyrotechnic system or a generator of electrical sparks.
4. The invention as in claim 1 wherein the pulses from said source of pulsed sound are strengthened by means of an acoustic reflector.
- 10 5. The invention as in claim 1 wherein the sound pulses from said source do not overlap the echoes from a buried object.

6. The invention as in claim 1 wherein the said source of sound pulses is  
5 approximately centered above said array of acoustic vector probes.

7. The invention as in claim 1 wherein the greatest dimension of said  
array of acoustic vector probes is approximately the distance of said source of  
sound pulses from the array.  
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8. The invention as in claim 1 wherein said processor controls the  
duration of the reception of echoes by said array.

9. The invention as in claim 1 wherein said output device enables an  
operator to use said acoustic apparatus interactively to detect, locate and identify  
buried objects, by adjusting the timing and duration of said sound pulses, by  
ensemble averaging said sound-intensity data, by filtering said data into any  
5 desired frequency bands and by adjusting the position of said array of acoustic  
vector probes and of said source of pulsed sound.